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(54) **[Title of the Invention] NAIL POLISH**

(57) [Abstract]

[Object] To provide a fast-drying and long-lasting nail polish.

[Constitution] Characterized by the fact that it contains 0.1-20.0 percent by weight of a copolymer consisting chiefly of at least one acrylic acid alkyl ester or methacrylic acid alkyl ester and at least one acrylic acid or methacrylic acid and that this copolymer has an acid number ranging from 30 to 100.

[Claims]

[Claim 1] Nail polish characterized by the fact that it contains 0.1-20.0 percent by weight of a copolymer consisting chiefly of at least one acrylic acid alkyl ester or methacrylic acid alkyl ester and at least one acrylic acid or methacrylic acid and that this copolymer has an acid number ranging from 30 to 100.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Application] The present invention concerns a novel improved nail polish. More specifically, it concerns a fast-drying, long-lasting nail polish in which the principal solvents are acetic acid esters.

[0002]

[The Prior Art and Problems To Be Solved by the Invention] In nail polish, a resin, such as nitrocellulose, and a plasticizer are dissolved in an organic solvent such as butyl acetate, ethyl acetate, or toluene; and organic bentonite or the like is used to disperse and stabilize the dyes and pigments. After the polish is applied, the organic solvent volatizes, leaving a nitrocellulose film containing the dyes and pigments firmly attached to the nail. A wide variety of fast-drying nail polishes have been studied in the prior art. Researchers have developed nail polishes in which drying is speeded up by raising the vapor pressure of the solvent system through the use of low-boiling-point solvents such as acetone, but air bubbles form in the applied films as they dry, making it impossible to obtain uniform films. Nail polishes in which drying of the surface is speeded up by using acryl silicon resin have also been developed, but they have poor lasting qualities, easily peeling or wearing under impact or rubbing. Thus, a nail polish that is both fast drying and long lasting has yet to be developed, and the development of such nail polish is an urgent priority [in the cosmetics industry].

[0003]

[Means of Solving the Problems] As a result of exhaustive studies aimed at solving these problems, the present inventors discovered that nail polish that dries quickly upon application and has good lasting qualities can be obtained using a copolymer which comprises chiefly at least one acrylic acid alkyl ester or methacrylic acid alkyl ester and at least one acrylic acid or methacrylic acid and in which the one or more acrylic acid(s) or methacrylic acid(s) are blended in such a way that the acid number of the copolymer is kept within the range of from 30 to 100.

[0004] Thus, the present invention provides a fast-drying, long-lasting nail polish characterized by the fact that it contains 0.1-20.0 percent by weight of a copolymer consisting chiefly of at least one acrylic acid alkyl ester or methacrylic acid alkyl ester and at least one acrylic acid or methacrylic acid and that this copolymer has an acid number ranging from 30 to 100.

[0005] The constitution of the invention is discussed in detail hereinbelow. In the polymer used in the invention, consisting of at least one acrylic acid alkyl ester or methacrylic acid alkyl ester and at least one acrylic acid or methacrylic acid, it is preferred that the alkyl group of the acrylic acid and methacrylic acid alkyl ester(s) have one to eight carbon atoms, with preferred methacrylic alkyl esters being methyl methacrylate and hydroxyethyl methacrylate and preferred acrylic acid alkyl esters being ethyl acrylate, hydroxyethyl acrylate, butyl acrylate, hexyl acrylate, and octyl acrylate.

[0006] Acrylic acid and methacrylic acid should be present in the copolymer in proportions such that the acid number of the copolymer ranges from 30 to 100, with 50 to 80 being preferred. If the acid number of the copolymer is less than 30, drying speed and lasting qualities are not improved, and if it exceeds 100, the copolymer will have excessive polarity, diminishing the moisture resistance of the film.

[0007] Other vinyl comonomers may be used in addition to acrylic acid alkyl esters, methacrylic acid alkyl esters, acrylic acid, and methacrylic acid, provided that the acid number remains in the 30-100 range. Examples of such vinyl comonomers include styrene, acrylonitrile, vinyl acetate, and acrylic amide.

[0008] The acid number of the copolymer may be measured in a mixed solvent of equal parts of ethanol and acetone or by titration in accordance with "Acid Number Measurement Method 2" in "General Testing Methods" of the *Cosmetic Materials Standards* [*Keshohin Genryo Kijun*, "Ippan Shiken-ho," "Sanka Sokutei-ho, Dai-2-ho"].

[0009] This copolymer is blended into the nail polish in amounts ranging from 0.1 to 20.0 percent by weight. If less than 0.1 percent by weight is used, fast-drying and lasting qualities are not improved, and if more than 20.0 percent by weight is used, the nail polish will be too viscous.

[0010] The solvent in the nail polish of the invention is a mixed system consisting chiefly of butyl acetate, ethyl acetate, and toluene to which alcohols such as ethanol, *n*-propanol, isopropanol, *n*-butanol, *t*-butanol may be added as desired.

[0011] In addition to the above-described copolymer, nitrocellulose, toluenesulfonamide resin, alkyd resin, and the like may also be used in the nail polish of the invention. In addition, colorants, plasticizers, viscosity regulators (gelling agents), antioxidants, fragrances, and the like may also be blended into the nail polish in suitable amounts.

[0012] Any colorant approved for use in cosmetics may be blended in the nail polish of the invention, examples including pigments such as red No. 201, red No. 202, red No. 220, red No. 225, red No. 226, yellow No. 4 aluminum lake, yellow No. 5 aluminum lake, blue No. 1 aluminum lake, yellow No. 401, and blue No. 404 as well as inorganic pigments such as titanium oxide, red iron oxide, yellow iron oxide, black iron oxide, ultramarine blue, Prussian blue,carbon black, titanium mica [sic], mica, and talc.

[0013] Plasticizers are blended in the nail polish of the invention to adjust the hardness of the copolymer. Examples include plasticizers known in the art such as dibutyl phthalate, butyl Cellosolve, camphor, acetyl triethyl citrate, and acetyl tributyl citrate as well as low-boiling-point esters such as propylene carbonate and 2,2,4-trimethylpentanediol 1,3-monisobutyrate.

[0014] Viscosity -regulators (gelling agents) are blended in the nail polish of the invention in order to maintain a level of viscosity that makes the polish easy to apply and to prevent precipitation of the pigments. Viscosity -regulators known in the art may be used, for example, dimethyldistearylammonium hectorite and benzyldimethylstearylammonium hectorite.

[0015] Tocopherols or their derivatives may be blended into the nail polish of the invention as antioxidants.

[0016]

[Working Examples] The present invention is described hereinbelow by means of working examples. Nail polishes were prepared using the formulations in Working Examples 1-6. Numbers in the tables indicate percentages by weight.

[0017] Working Example 1

[0018]

[Table 1]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Methyl methacrylate-octyl acrylate-acrylic acid copolymer (acid number 30)	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0019] Working Example 2

[Table 2]

[0020]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Methyl methacrylate-octyl acrylate-acrylic acid copolymer (acid number 50)	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0021] Working Example 3

[Table 3]

[0022]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Methyl methacrylate-octyl acrylate-acrylic acid copolymer (acid number 80)	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0023] Working Example 4 [Table 4]

[0024]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Methyl methacrylate-octyl acrylate-acrylic acid copolymer (acid number 100)	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0025] Working Example 5 [Table 5]

[0026]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Styrene-octyl acrylate-acrylic acid copolymer (acid number 60)	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0027] Working Example 6 [Table 6]

[0028]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Styrene-methyl methacrylate-octyl acrylate-acrylic acid copolymer (acid number 60)	5.0
Toluenesulfonamide resin	5.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0029] Nail polishes were also prepared using the formulations in Comparative Examples 1-3.

[0030] Comparative Example 1

[0031]

[Table 7]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Toluenesulfonamide resin	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0032] Comparative Example 2

[0033]

[Table 8]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Methyl methacrylate-octyl acrylate-acrylic acid copolymer (acid number 20)	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0034] Comparative Example 3

[0035]

[Table 9]

Components	Blending Ratio
Nitrocellulose (1/4 sec)	18.0
Styrene-methyl methacrylate-octyl acrylate copolymer (acid number 0)	10.0
Dibutyl phthalate	5.6
Ethyl acetate	12.0
Butyl acetate	45.9
Isopropanol	5.0
Benzyldimethylstearylammonium hectorite	0.9
Colorant	2.6

[0036] The practical properties of the polishes were tested, and the results are shown in Table 10 hereinbelow. A panel of 20 women applied the polishes to their nails and rated the polishes on a five-grade scale (5, excellent; 4, good; 3, fair; 2, poor; 1, very poor). Mean ratings are shown in the table.

[0037]

[Table 10]

	Ease of Application	Color Uniformity	Drying Speed	Film Gloss	Lasting Quality
Working Example 1	3.8	3.9	4.4	4.1	4.2
Working Example 2	3.7	4.0	4.8	4.4	4.6
Working Example 3	3.9	3.9	4.6	3.9	4.4
Working Example 4	4.0	3.8	4.8	4.0	4.4
Working Example 5	4.0	3.7	4.5	4.2	4.7
Working Example 6	3.9	3.7	4.6	4.0	4.8
Comparative Example 1	3.8	3.8	2.8	4.0	2.9
Comparative Example 2	3.9	3.7	2.6	4.1	3.2
Comparative Example 3	4.0	3.9	3.0	4.0	3.0

[0038] It is clear from Table 10 that the examples of the invention were faster drying and longer lasting than the comparative examples.

[0039]

[Effect of the Invention] The nail polish of the invention shows excellent fast-drying and lasting qualities.